

**Unit 1 – Biology (Knowledge: 14 marks; Inquiry (Thinking): 6 marks; Communication: 4 marks; Application: 5 marks)**

1. Fat, bone and blood are examples of what type of tissue?
  - a) epithelial
  - b) nervous
  - c) muscle
  - d) connective
  
2. This organ system is responsible for hormone production.
  - a) Endocrine system
  - b) Nervous system
  - c) Integumentary system
  - d) Excretory system
  
3. This organ system supports, protects and works *with* muscles to move parts of the body.
  - a) integumentary system
  - b) skeletal system
  - c) nervous system
  - d) reproductive system
  
5. Which of the following is not a phase of mitosis?
  - a) Prophase
  - b) Anaphase
  - c) Telophase
  - d) Metaphase
  - e) Mesophase
  
6. Which cell component is responsible for conversion of glucose to a more usable form of energy?
  - a) Mitochondria
  - b) Golgi Body
  - c) Chloroplast
  - d) Vacuole
  - e) Ribosome

7. Using the images below, label **DNA**, **genes** and **base pairs**. Draw your arrows carefully ... if we can't tell what it's pointing to, you will not be awarded marks!



9. Describe what is a **tumour** and why may it be later diagnosed as **cancer**?

10. Match the organelles below to their definitions.

- |                             |  |
|-----------------------------|--|
| _____ Nucleus               | A. Storage of sugars and proteins                                      |
| _____ Ribosomes             | B. Converts glucose into energy for the cell.                          |
| _____ Endoplasmic reticulum | C. Filaments and tubules that provide a framework for the cell         |
| _____ Golgi apparatus       | D. Sorts and packages proteins   |
| _____ Chloroplasts          | E. Control Centre of the Cell  |
| _____ Mitochondria          | F. This is the “goo” that organelles in the cell float around in       |
| _____ Cytoplasm             | G. Creates protein   |
| _____ Cytoskeleton          | H. Found only in plant cells, these are responsible for photosynthesis |
| _____ Vacuole               | I. Connected to the nucleus, this is where ribosomes hang out          |
| _____ Cell Wall             | J. Rigid outer layer of plant cells                                    |

11. Explain the functions of xylem and phloem.

12. Animal cells and plants cells have many similarities, and some differences as well. Please list 3 key differences in their *structure* below.

13. Of the four medical imaging technologies that we studied, which would you use in each of the following situations?

A kid falls off his bike, and his brain needs to be checked for bleeding.

\_\_\_\_\_

A pregnant woman wants to know if she's having twins.

\_\_\_\_\_

A cliff diver needs to be checked for fractured bones.

\_\_\_\_\_

A woman is believed to have a damaged heart ... we need to see it in 3D.

\_\_\_\_\_

14. Should certain forms of stem cells (i.e. embryonic) be banned, while others (i.e. umbilical) become/remain funded? Give two points supporting your point of view.

**Unit 2 – Chemistry (Knowledge: 12 marks; Inquiry (Thinking): 6 marks; Communication: 5 marks; Application: 9 marks)**

1. Which one of the following elements has 5 valence electrons?

- a) boron
- b) lithium
- c) hydrogen
- d) iodine
- e) nitrogen

2. When a chemical reaction takes place, the total mass of the products is always what?
- a) Greater than the total mass of the reactants
  - b) Less than the total mass of the reactant
  - c) Equal to the total mass of the reactant
  - d) Dependent on the type of reaction
  - e) Impossible to determine
3. What is another name for a negative ion?
- a) valence electron
  - b) ionic compound
  - c) anion
  - d) cation
  - e) stable octet
4. What is the correct chemical formula for Calcium Nitride?
- a) CaN
  - b) Ca<sub>2</sub>N
  - c) Ca<sub>2</sub>N<sub>3</sub>
  - d) Ca<sub>3</sub>N<sub>2</sub>
  - e) Ca(NO<sub>3</sub>)<sub>2</sub>
5. Which of the following metals does NOT have more than one possible ion charge?
- a) Mn
  - b) Fe
  - c) Zn
  - d) Cu
  - e) Sn
6. Which best describes the pH of acids?
- a) Higher than 0
  - b) Lower than 0
  - c) Approximately 0
  - d) Lower than 7
  - e) Higher than 7
7. Which of the following combinations would give a neutralization reaction?
- a) LiOH + Ca(NO)<sub>2</sub>
  - b) H<sub>3</sub>PO<sub>4</sub> + CH<sub>4</sub>
  - c) SCl<sub>6</sub> + BeF<sub>2</sub>
  - d) Cu + AlF<sub>3</sub>
  - e) HCl + Ca(OH)<sub>2</sub>

8. Which of the following contributes to making acid rain?

- a)  $\text{N}_2$
- b)  $\text{NH}_3$
- c)  $\text{HBr}$
- d)  $\text{SO}_3$
- e)  $\text{Ca}(\text{OH})_2$

9. Write the IUPAC (full) name for each of the following compounds.

a)  $\text{Mg}(\text{ClO})_2$  (ionic) \_\_\_\_\_

b)  $\text{CuF}_2$  (Ionic) \_\_\_\_\_

c)  $\text{Sb}_2\text{F}_3$  (Covalent/Molecular) \_\_\_\_\_

d)  $\text{Li}_2\text{SO}_4$  (Ionic) \_\_\_\_\_

10. Write the chemical formula (balanced) for each compound.

a) Cesium Chloride (ionic) \_\_\_\_\_

b) Sodium Carbonate (ionic) \_\_\_\_\_

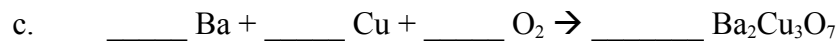
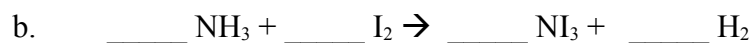
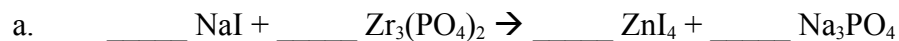
c) Manganese (IV) Sulfate (ionic) \_\_\_\_\_

d) Dihydrogen Disulfide (covalent/molecular) \_\_\_\_\_

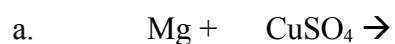
10. Label each chemical reaction as synthesis, decomposition, combustion, single displacement, or double displacement:



13. Balance each of the following chemical reactions:



14. Predict the products, write the proper chemical formula for each product, and balance the equation for the following.



**Unit 3 – Climate Change (Knowledge: 13 marks; Inquiry (Thinking): 4 marks; Communication: 4 marks; Application: 4 marks)**

1. What is the IPCC?

- a) Independent Panel on Climate Change
- b) Intercontinental Panel on Climate Change
- c) Intergovernmental Panel on Climate Change
- d) International Panel on Climate Change
- e) Investigative Panel on Climate Change

2. Which of the following is *not* expected to happen as global temperatures increases?
- a) Increased frequency of severe weather
  - b) Sea levels rise
  - c) Change in solar constant
  - d) Increased carbon dioxide concentrations
  - e) Polar ice melts
3. Decreases in precipitation can lead to what?
- a) Desertification
  - b) Deforestation
  - c) Orographic effect
  - d) Thermohaline circulation
  - e) None of the above
4. The 23.5° tilt of the Earth's axis contributes to creating what?
- a) Increased cloud cover
  - b) Night and day
  - c) The various seasons
  - d) Constant temperatures around globe
  - e) None of the above
5. The layer of gases that surrounds a planet or moon is known as the what?
- a) Biosphere
  - b) Lithosphere
  - c) Hydrosphere
  - d) Gaseousphere
  - e) Atmosphere
6. According to the film "Strange Days on Planet Earth", *two* methods of reducing the amount of fertilizer runoff seeping into the water that were mentioned include what?
- a) Eliminating fertilizers & Increasing their amount of water
  - b) Creating rooftop gardens & Increasing the amount of "nutrients" within the soil
  - c) Creating rooftop gardens & Restructuring the lay-out of farmlands and the way that they drain
  - d) Increase the populations of the nearby species (especially insects) & Restructuring the lay-out of farmlands and the way that they drain
  - e) Use stronger fertilizers that will be required less often & Grow more crops

7. Match the following definitions to the corresponding words.

___ Conduction	A) Heat transfer <i>without</i> touching
___ Convection	B) A current of fast-moving air in the upper troposphere
___ Radiation	C) Heat transfer by touching
___ Greenhouse Gas	D) A region that shares plants, animals and climate characteristics
___ Biome	E) Caused by human activity
___ Anthropogenic	F) Heat transfer by motion in gases and liquids
___ Climatograph	G) A representation of precipitation and temperature data
___ Jet Stream	H) Molecules in the atmosphere that trap heat

8.

a) What is the **greenhouse effect**? You may use a diagram if you wish.

b) What is the difference between the **natural** and **anthropogenic** greenhouse effects?

9. What is the **albedo effect**? Explain how Earth's albedo is expected to change as the Earth warms.

10. Give an example of a **positive feedback loop** that relates to climate.

11. Give an example of a **negative feedback loop** that relates to climate.

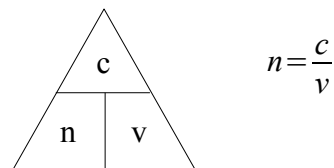


12. Name three methods that scientists use to discover what climate used to be like.
13. Explain how a volcanic eruption in the Philippines can affect temperatures across the entire planet.

**Unit 4 – Optics (Knowledge: 19 marks; Inquiry (Thinking): 4 marks; Communication: 0 marks; Application: 12 marks)**

1. A transparent substance has an index of refraction of 2.1. How fast does light pass through this substance?

- a)  $1.4 \times 10^8$  m/s
- b)  $2.1 \times 10^8$  m/s
- c)  $3.0 \times 10^7$  m/s
- d)  $6.3 \times 10^8$  m/s



2. The focal length of a convex mirror is:

- a) 0
- b) the distance to the centre of curvature,  $C$
- c) positive
- d) negative

3. What is a concave mirror?

- a) It is a mirror that has a reflecting surface that curves outward.
- b) It is a mirror with a flat reflecting surface.
- c) It is a mirror that has a reflecting surface that curves inward.
- d) It is a type of mirror that creates an image identical to the object in terms of orientation, size, and location.

4. The phosphor coating inside a fluorescent light bulb absorbs what kind of radiation before emitting it as visible light?
- a) Microwave
  - b) Infrared
  - c) Visible
  - d) Ultraviolet
  - e) X-Ray
5. A convex mirror that has a centre of curvature at 24 cm has a focal length of how long?
- a) 24 cm
  - b) 12 cm
  - c) -24 cm
  - d) -12 cm
6. When the image is behind a concave mirror, what is the value of the image distance in the mirror equation?
- a) The image distance,  $d_i$ , is positive.
  - b) The image distance,  $d_i$ , is negative.
  - c) The image distance,  $d_i$ , is exactly zero.
  - d) An image cannot appear behind a concave mirror.
7. What is a spherical aberration?
- a) It is an image that is formed when reflected rays meet.
  - b) It is a change in the size of an optically produced image.
  - c) It is a type of irregularity in an image seen in a curved mirror.
  - d) It is a type of mirror that has a reflecting surface that curves inward.
8. When do spherical aberrations occur?
- a) They occur when reflected rays from the inner parts of the mirror do not go through the focal point.
  - b) They occur when reflected rays from the outer parts of the mirror do not go through the focal point.
  - c) They occur when reflected rays from the inner parts of the mirror go through the focal point.
  - d) They occur when reflected rays from the outer parts of the mirror go through the focal point.
9. What does a negative value of  $h_i$  represent?
- a) inverted image
  - b) upright image
  - c) real image
  - d) virtual image

10. What does a negative value of  $d_i$  represent?

- a) inverted image
- b) upright image
- c) real image
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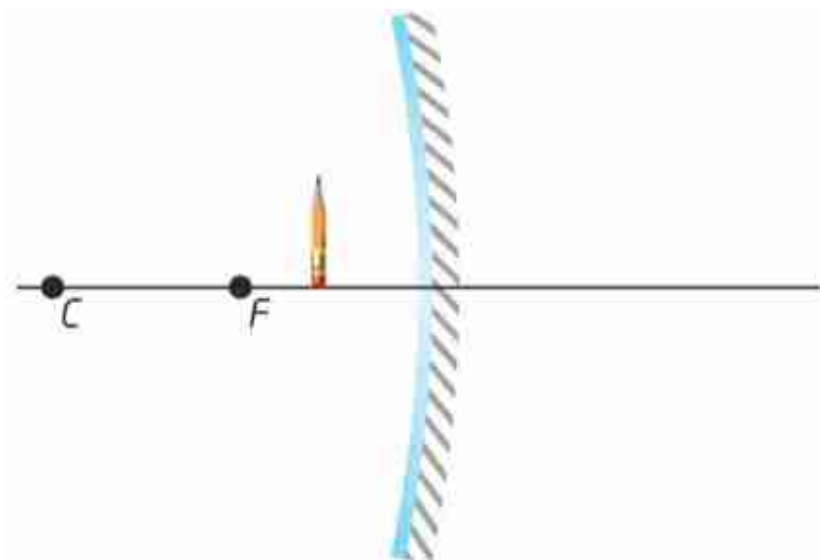
11. What does a negative focal length represent?

- a) convex mirror
- b) concave mirror
- c) negative index of refraction
- d) index of refraction greater than 1

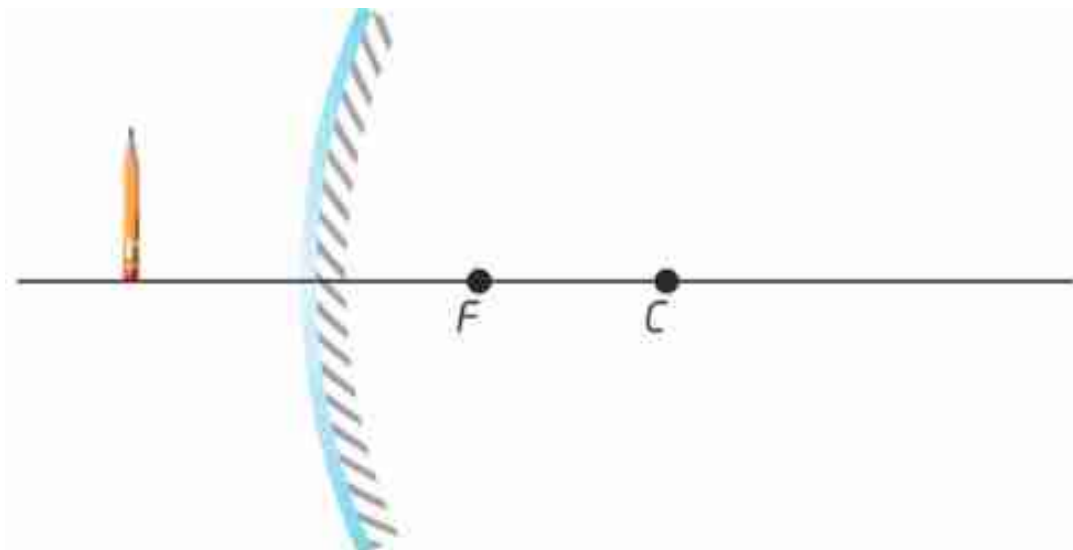
12. Match the following definitions to the corresponding words.

___ Dispersion	A) The process of separating colours by refraction
___ Excited	B) This describes the state of atoms just after absorbing energy
___ Inverted	C) This word describes an image that is upside-down
___ Incandescence	D) Light emitted from a high-temperature material
___ Fluorescence	E) Light that is emitted during exposure to UV radiation
___ Bioluminescence	F) Light produced by a chemical reaction in a living organism
___ Wavelength	G) The distance from one crest (or trough) of a wave to the next crest (or trough).
___ White	H) Light that is made up of many different colours mixed together

13. Using the diagram below, draw the appropriate incident and reflected rays to help you predict where the image will lie. Be clear about where the image is!

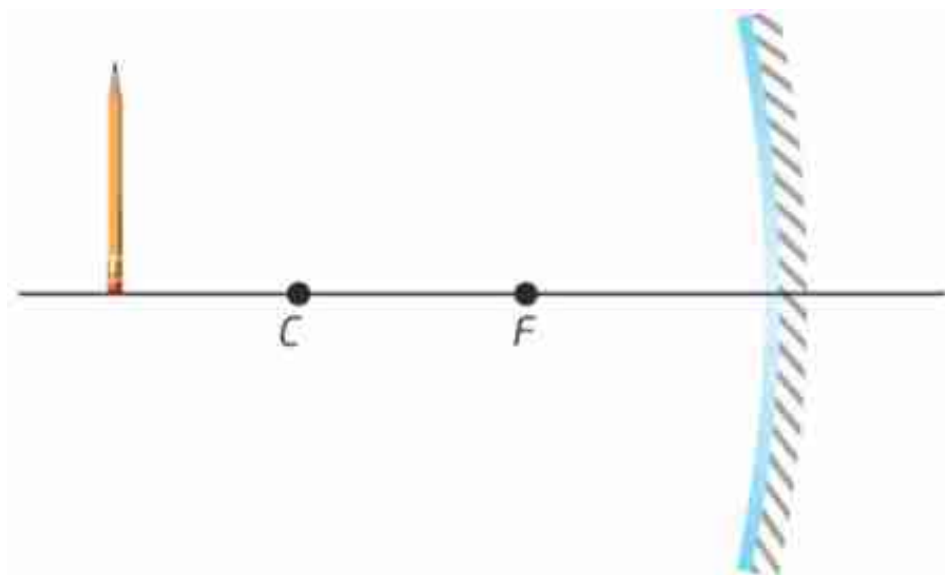


14. Using the diagram below, draw the appropriate incident and reflected rays to help you predict where the image will lie. Be clear about where the image is!



15.

- a) Using the diagram below, draw the appropriate incident and reflected rays to help you predict where the image will lie. Be clear about where the image is!



- b) Circle the appropriate description for each characteristic of the image.

<b>Image Location</b>	Closer to mirror		Farther from mirror	
<b>Image height (compared to object)</b>	Larger	Equal	Smaller	
<b>Orientation</b>	Inverted		Upright	
<b>Image Type</b>	Real		Virtual	

- c) Use the mirror equation to determine the image distance.

$$\frac{1}{f} = \frac{1}{d_i} + \frac{1}{d_o}$$

- d) Use the magnification equation to determine the image height.

$$m = \frac{h_i}{h_o} = \frac{-d_i}{d_o}$$